BT05VG2

1500-4000 MHz Wideband Drive Amplifier

Device Features

- OIP3 = 40.5 dBm @ 1900 MHz
- Gain = 19.0 dB @ 1900 MHz
- Output P1 dB = 22.7 dBm @ 1900 MHz
- 50 Ω Cascadable
- Patented Over Voltage Protection Circuit
- Lead-free/RoHS-compliant SOT-89 SMT package

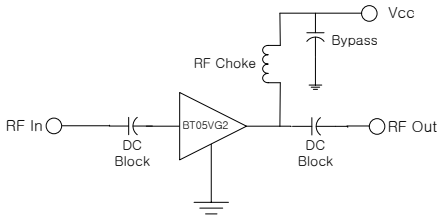
Product Description

BeRex's BT05VG2 is a high performance and a high dynamic range amplifier in a low cost surface mount package(SOT-89) with a RoHS -compliant, that incorporates reliable het-erojunction-bipolar-transistor (HBT) devices fabricated with InGaP GaAs technology. This device is designed for use where high linearity is required and features high OIP3 and P1 with low consumption current (85mA) and requires a few external match-ing components such as a DC blocking ca-pacitors on the In/Output pin, a bypass ca-pacitor and a RF choke for the out port. All devices are 100% RF/DC tested.

Applications

- Base station Infrastructure/RFID
- Commercial/Industrial/Military wireless system

Application Circuits



*external matching circuit: refer to the page 5 to 11.

Typical Performance[1]

Parameter	Frequency				Unit
	1900	2100	2450	3500	MHz
Gain	19.0	18.0	16.5	13.7	dB
S11	-18.5	-15.6	-26.1	-22.0	dB
S22	-14.9	-19.1	-19.4	-20.0	dB
OIP3[2]	40.5	38.0	38.0	39.0	dBm
P1dB	22.7	22.0	23.2	23.5	dBm
Noise Figure	3.9	4.0	4.2	4.4	dB

[1] Device performance _ measured on a BeRex evaluation board at 25°C, 50 Ω system.

[2] OIP3 _ measured with two tones at an output of 11 dBm per tone separated by 1 MHz.

	Min.	Typical	Max.	Unit
Bandwidth	1500		4000	MHz
I_C @ (Vc = 5V)	75	85	95	mA
V_C		5.0		V
R_{TH}		50		°C/W

Absolute Maximum Ratings

Parameter	Rating	Unit
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+220	°C
Operating Voltage	+6.0	V
Supply Current	180	mA
Input RF Power	23	dBm

*Operation of this device above any of these parameters may result in permanent damage.

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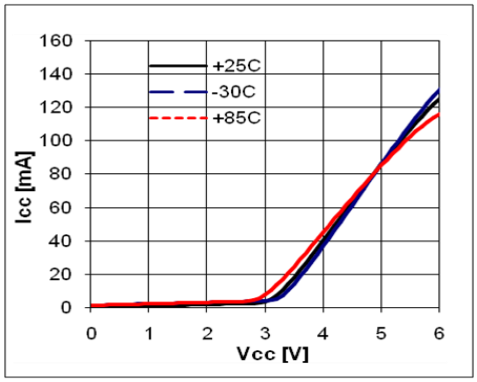
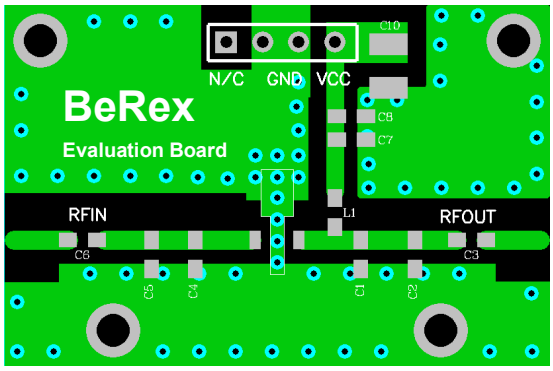
V-I Characteristics



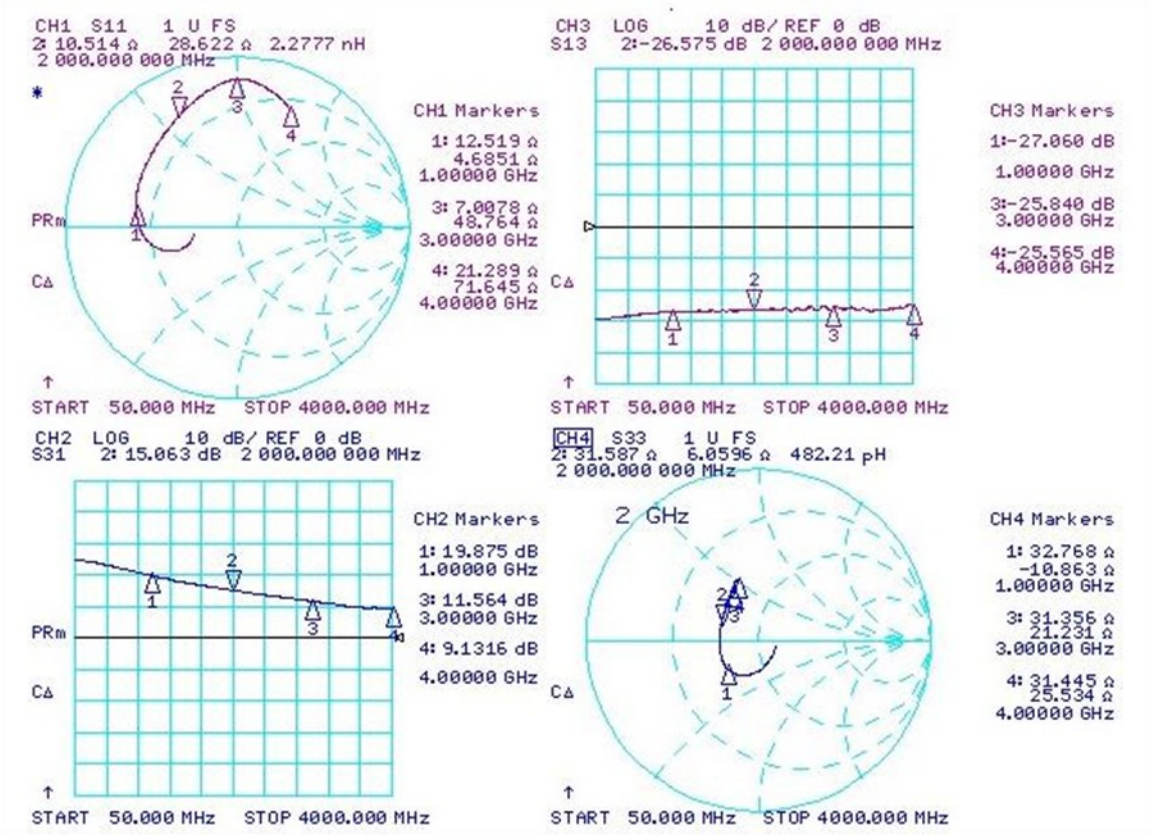
BeRex SOT89 Evaluation Board



*Dielectric constant _ 4.2 *RF pattern width 52mil *31mil thick FR4 PCB

Typical Device Data

S-parameters (Vc=5V, Ic=90mA, T=25°C)



BT05VG2

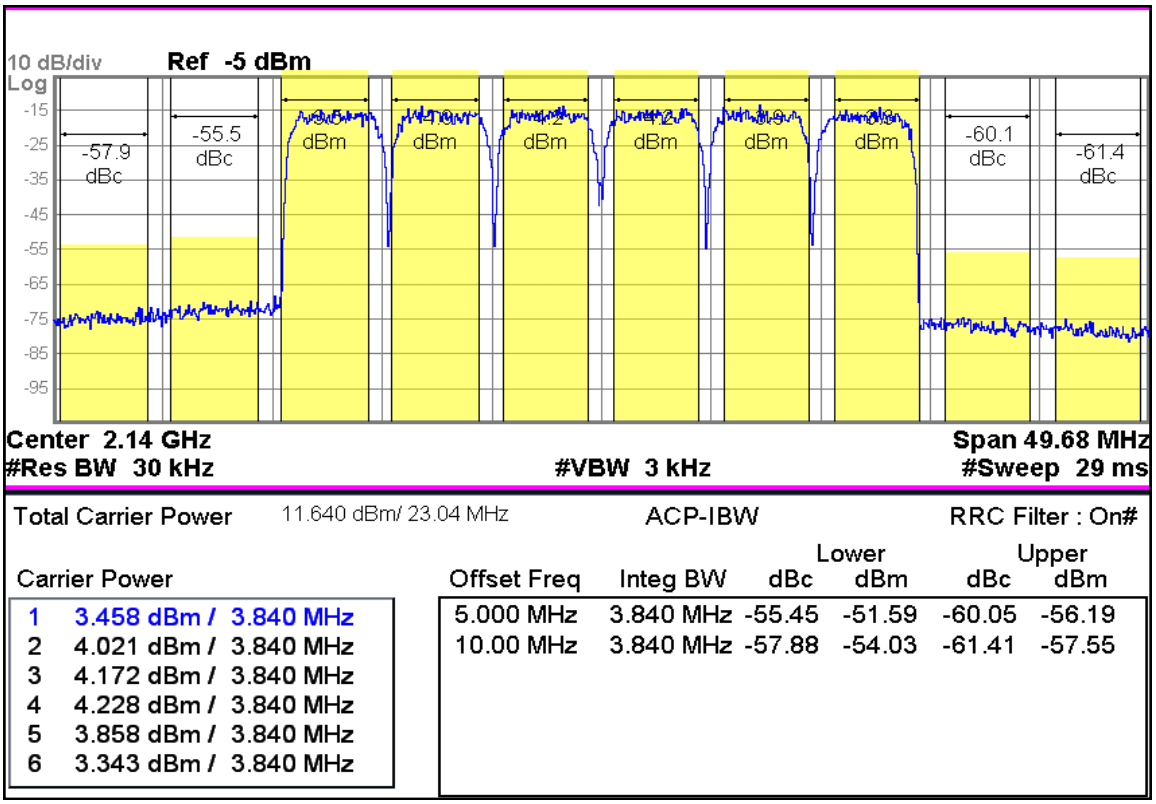
1500-4000 MHz Wideband Drive Amplifier

S-Parameter

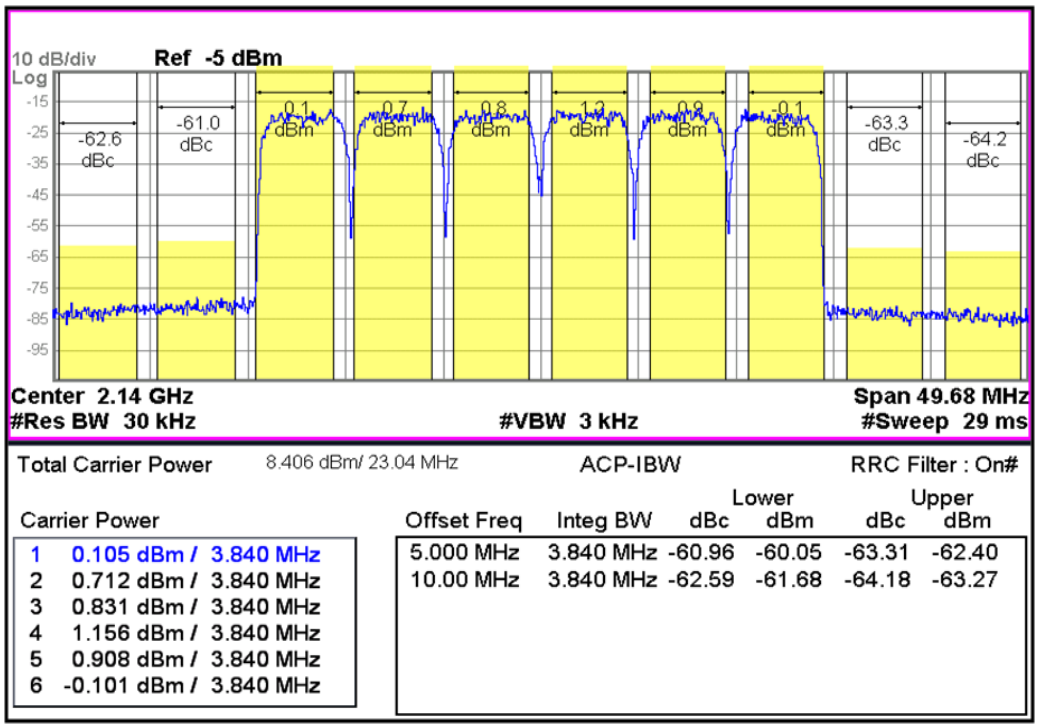
(Vdevice = 5.0V, Icc = 88mA, T = 25 °C, calibrated to device leads)

Freq [MHz]	S11 [Mag]	S11 [Ang]	S21 [Mag]	S21 [Ang]	S12 [Mag]	S12 [Ang]	S22 [Mag]	S22 [Ang]
100	0.270	-166.495	17.095	169.234	0.034	2.969	0.112	-36.553
500	0.484	-165.550	13.796	134.745	0.039	9.708	0.209	-115.545
1000	0.603	169.297	9.839	107.471	0.045	8.523	0.243	-138.751
1500	0.649	142.996	7.265	89.329	0.046	6.978	0.224	-166.419
2000	0.727	119.846	5.645	75.285	0.047	7.094	0.232	159.675
2500	0.812	103.333	4.578	65.518	0.046	7.622	0.276	133.104
3000	0.860	91.901	3.760	57.542	0.050	4.871	0.326	118.486
3500	0.845	82.120	3.142	48.480	0.046	4.636	0.365	112.242
4000	0.768	68.638	2.817	40.568	0.054	0.845	0.369	110.182

WCDMA 6FA 2140 -55dBc



WCDMA 6FA 2140 -60dBc



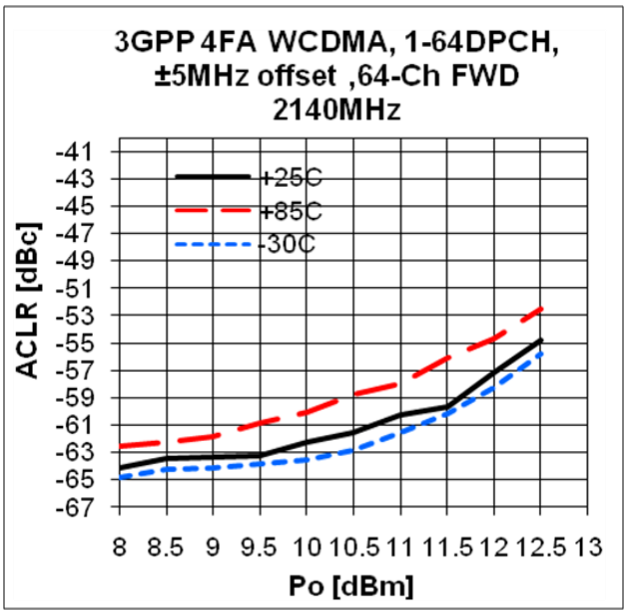
Total Carrier Power 8.406 dBm/ 23.04 MHz ACP-IBW RRC Filter : On#

Carrier Power

1	0.105 dBm /	3.840 MHz
2	0.712 dBm /	3.840 MHz
3	0.831 dBm /	3.840 MHz
4	1.156 dBm /	3.840 MHz
5	0.908 dBm /	3.840 MHz
6	-0.101 dBm /	3.840 MHz

Offset Freq	Integ BW	Lower dBc	Lower dBm	Upper dBc	Upper dBm
5.000 MHz	3.840 MHz	-60.96	-60.05	-63.31	-62.40
10.00 MHz	3.840 MHz	-62.59	-61.68	-64.18	-63.27

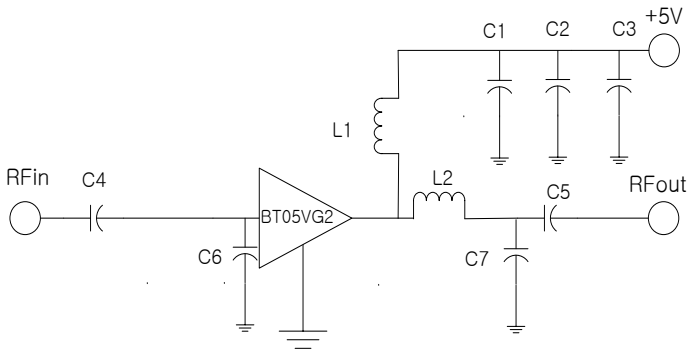
ACLR

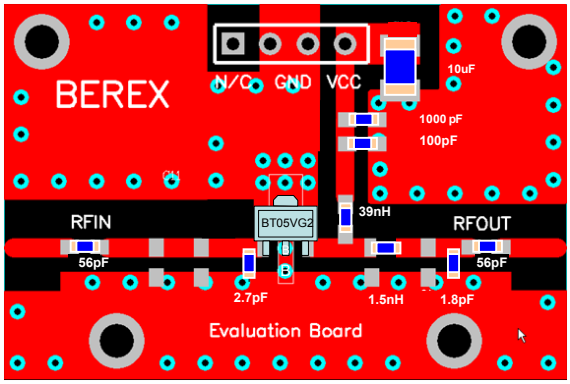


BT05VG2

1500-4000 MHz Wideband Drive Amplifier

Application Circuit: 1900 MHz

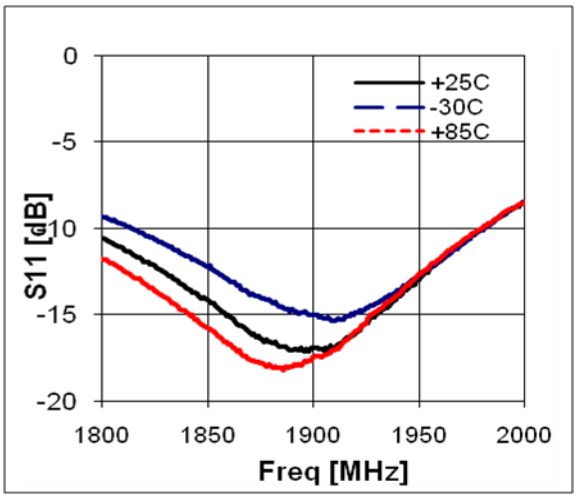
Schematic Diagram	BOM		Tolerance
	C1	100pF	± 5%
	C2	1000pF	± 5%
	C3	10uF	± 20%
	C4	56pF	± 5%
	C5	56pF	± 5%
	C6	2.7pF	± 5%
	C7	1.8pF	± 5%
	L1	39nH	±5%
	L2	1.5nH	±5%

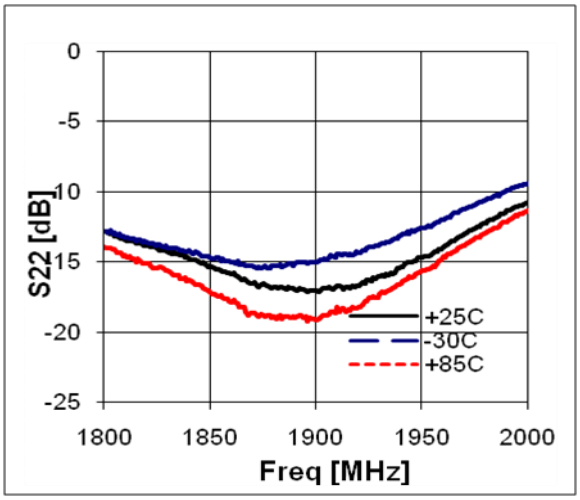


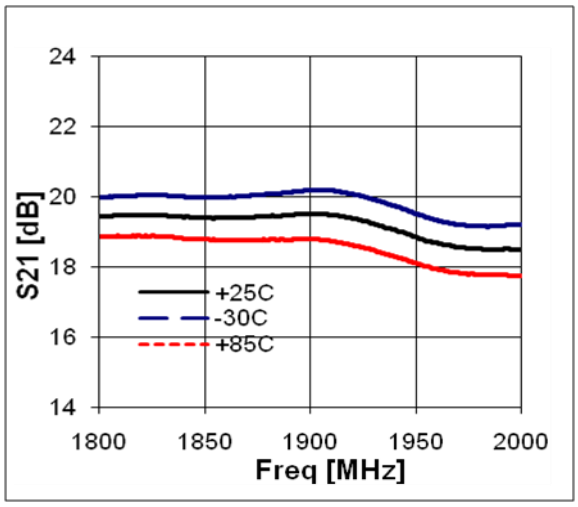
Note:

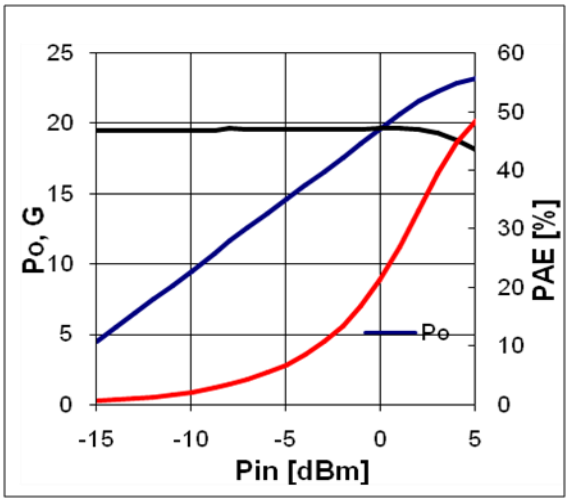
1. PCB: 31mil thick FR4.
2. Distance between the center of the shunt cap(C6) and the input pin of BT05VG2 _ ***0.8mm.***
3. Distance between the center of the series inductor(L2) and the output pin of BT05VG2 _ ***3.5mm.***
4. Distance between the center of the shunt cap(C7) and the output pin of BT05VG2 _ ***9.0mm.***

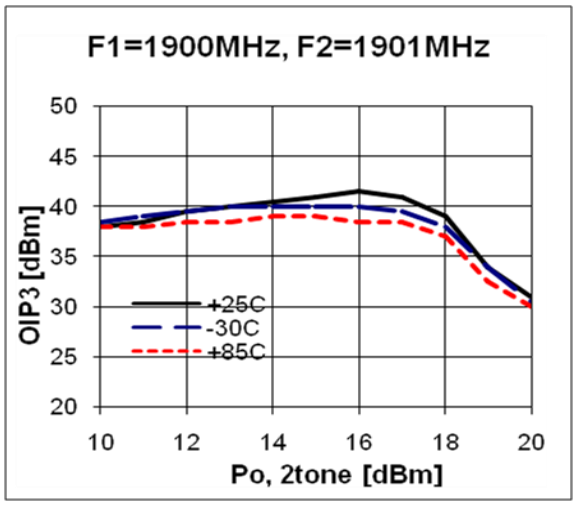
Typical Performance

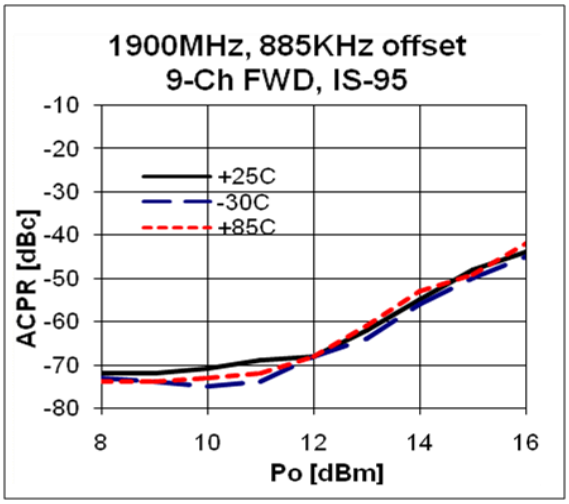








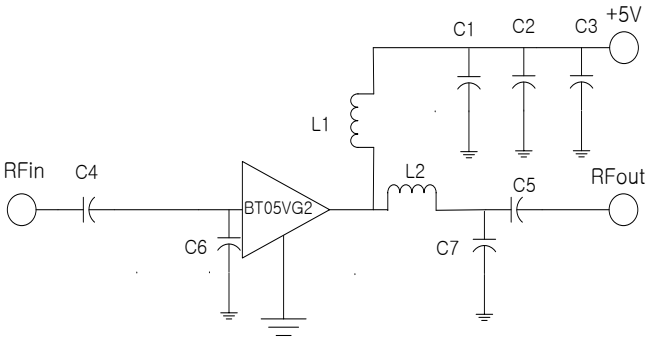


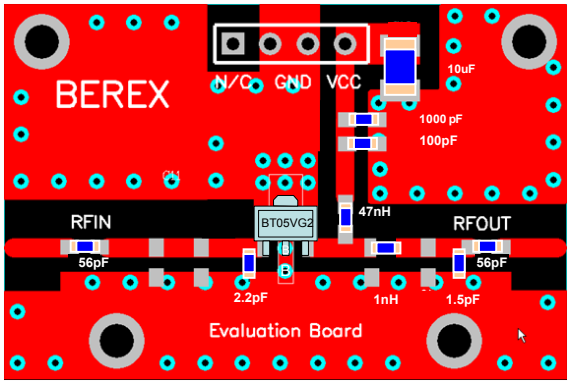


BT05VG2

1500-4000 MHz Wideband Drive Amplifier

Application Circuit: 2100 MHz

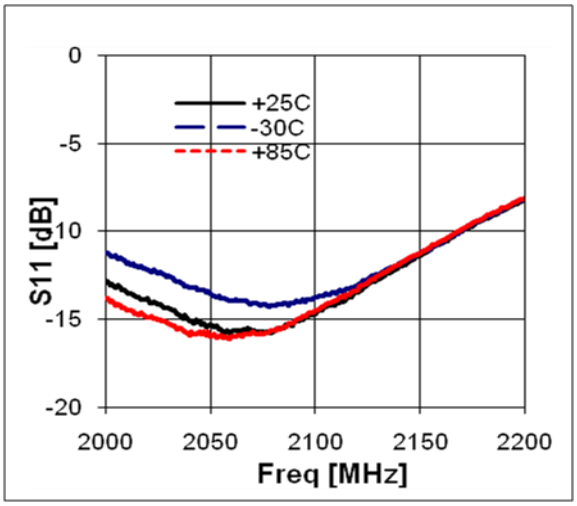
Schematic Diagram	BOM		Tolerance
	C1	100pF	± 5%
	C2	1000pF	± 5%
	C3	10uF	± 20%
	C4	56pF	± 5%
	C5	56pF	± 5%
	C6	2.2pF	± 5%
	C7	1.5pF	± 5%
	L1	47nH	±5%
	L2	1nH	±5%

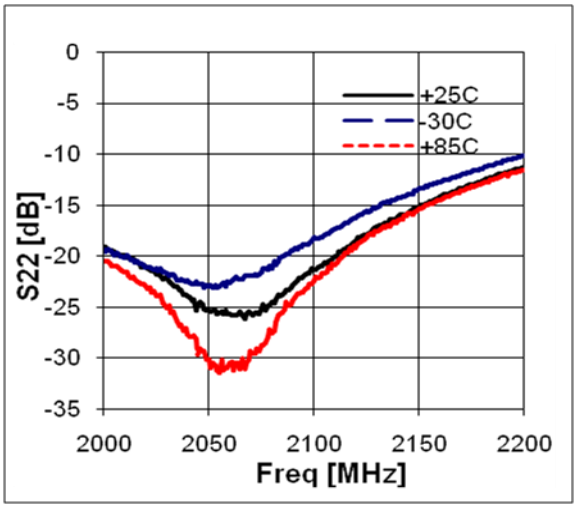


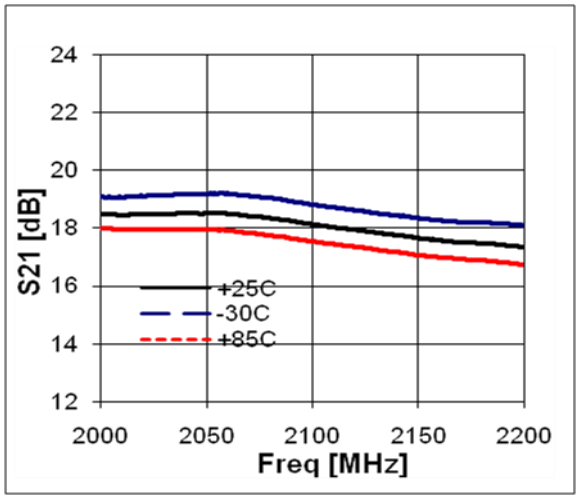
Note:

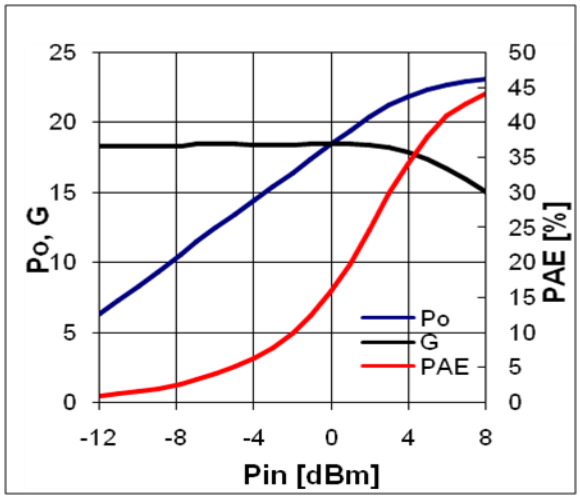
1. PCB: 31mil thick FR4.
2. Distance between the center of the shunt cap(C6) and the input pin of BT05VG2 _ ***0.7mm.***
3. Distance between the center of the series inductor (L2) and the output pin of BT05VG2 _ ***3.5mm.***
4. Distance between the center of the shunt cap(C7) and the output pin of BT05VG2 _ ***9.5mm.***

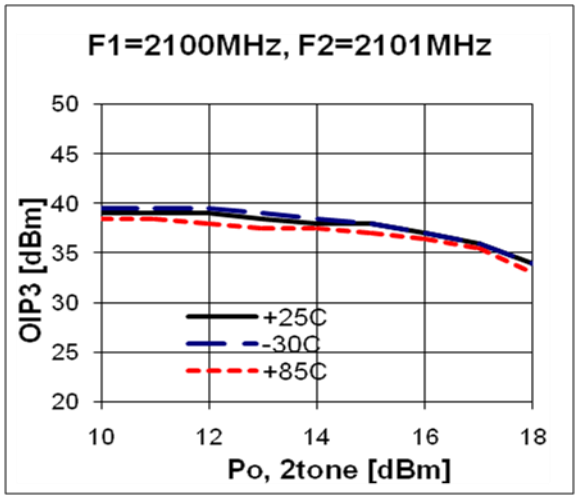
Typical Performance



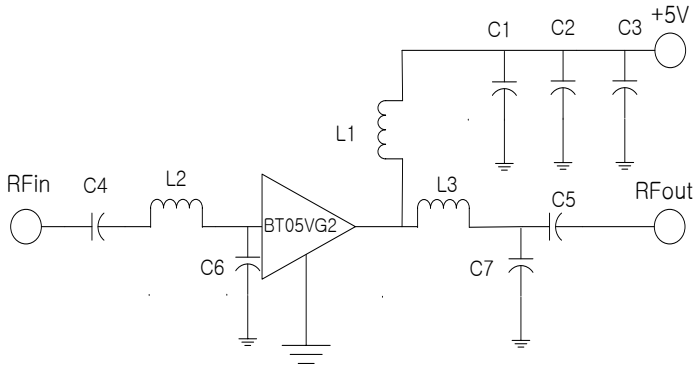


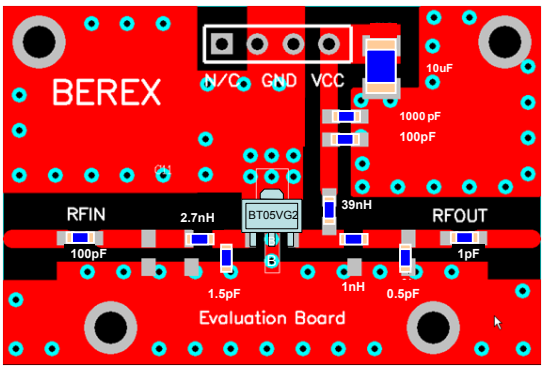






Application Circuit: 2450MHz

Schematic Diagram	BOM		Tolerance
	C1	100pF	± 5%
	C2	1000pF	± 5%
	C3	10uF	± 20%
	C4	100pF	± 5%
	C5	1pF	± 5%
	C6	1.5pF	± 5%
	C7	0.5pF	± 5%
	L1	39nH	±5%
	L2	2.7nH	±5%
	L3	1nH	±5%



Note: 1. PCB: 31mil thick FR4.

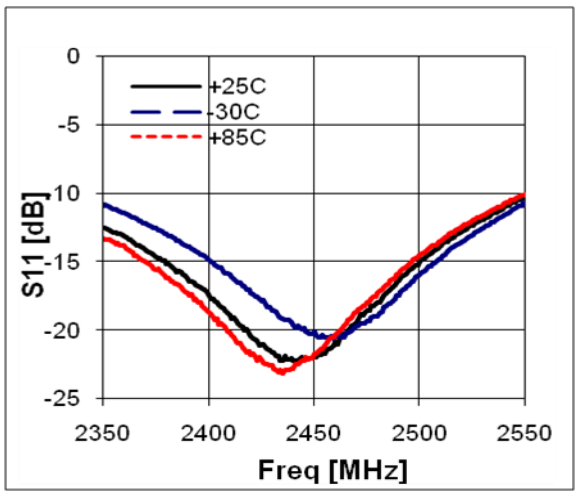
2. Distance between the center of the series inductor (L2) and the input pin of BT05VG2 _ ***2.5mm.***

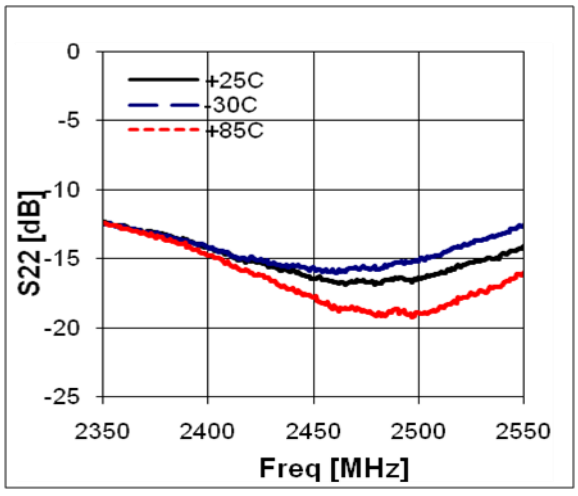
3. Distance between the center of the shunt cap(C6) and the input pin of BT05VG2 _ ***0.5mm.***

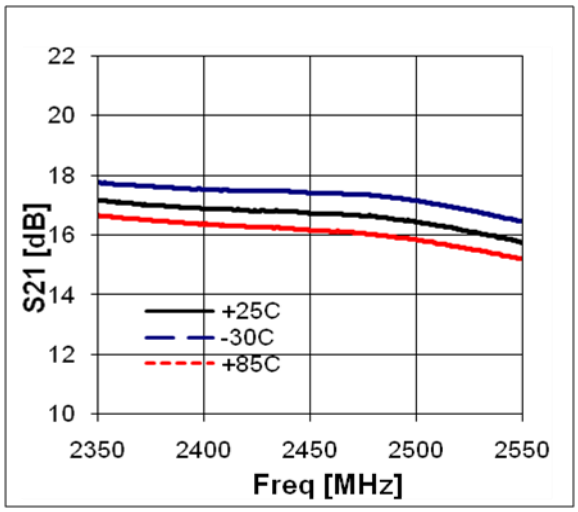
4. Distance between the center of the series inductor (L3) and the output pin of BT05VG2 _ ***3.5mm.***

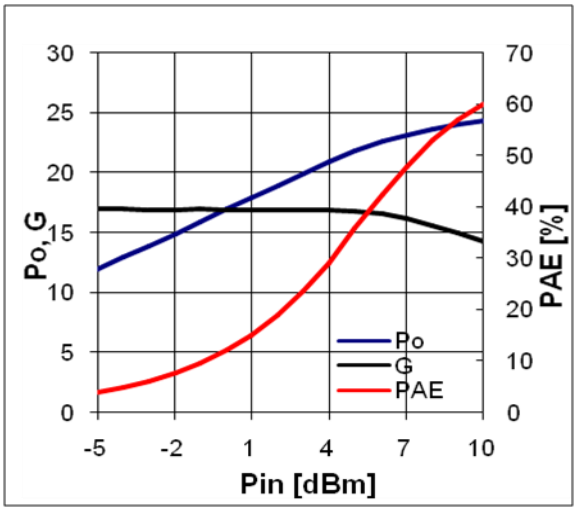
5. Distance between the center of the shunt cap(C7) and the output pin of BT05VG2 _ ***5.5mm.***

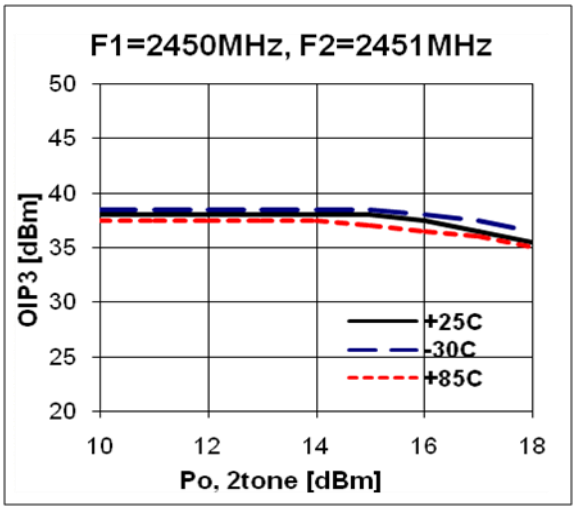
Typical Performance







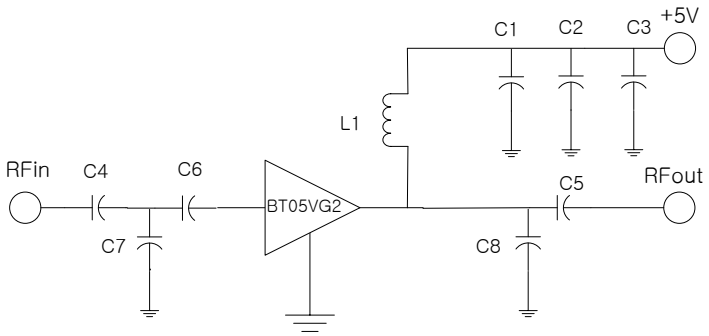


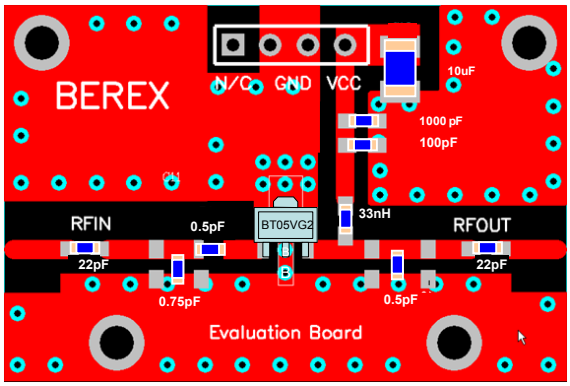


BT05VG2

1500-4000 MHz Wideband Drive Amplifier

Application Circuit: 3500MHz

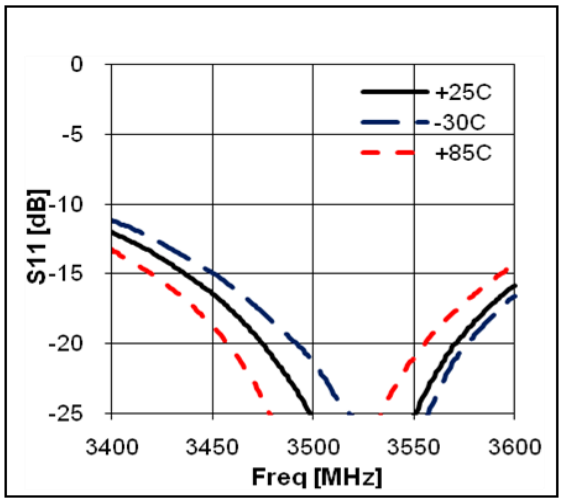
Schematic Diagram	BOM		Tolerance
	C1	100pF	± 5%
	C2	1000pF	± 5%
	C3	10uF	± 20%
	C4	22pF	± 5%
	C5	22pF	± 5%
	C6	0.5pF	± 5%
	C7	0.75pF	±5%
	C8	0.5pF	±5%
	L1	33nH	±5%

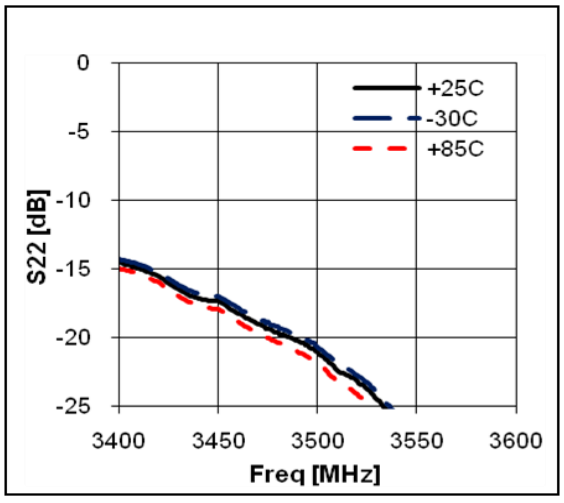


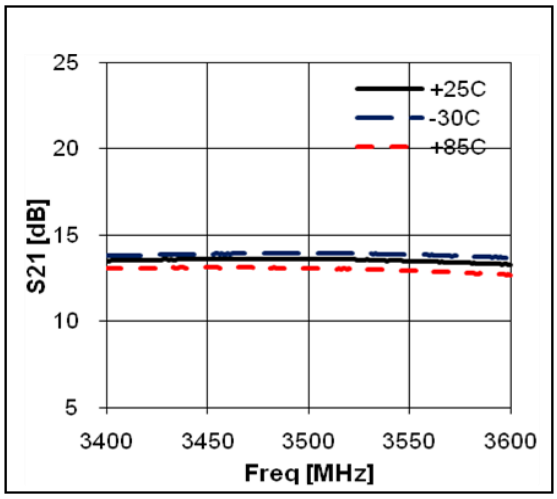
Note:

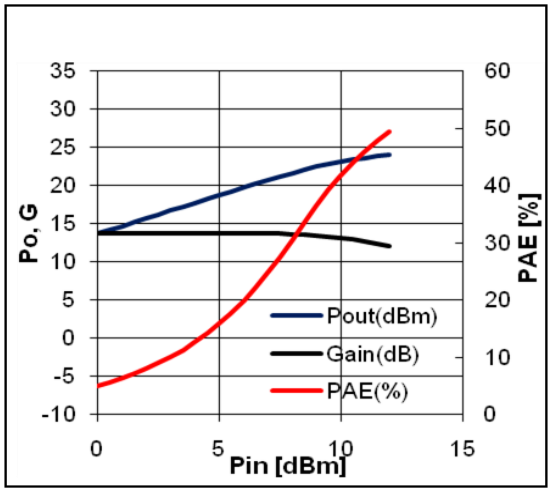
1. PCB: 31mil thick FR4.
2. Distance between the center of the series cap(C6) and the input pin of BT05VG2 _ ***2.5mm.***
3. Distance between the center of the shunt cap(C7) and the input pin of BT05VG2 _ ***7.1mm.***
4. Distance between the center of the shunt cap(C8) and the output pin of BT05VG2 _ ***7.7mm.***

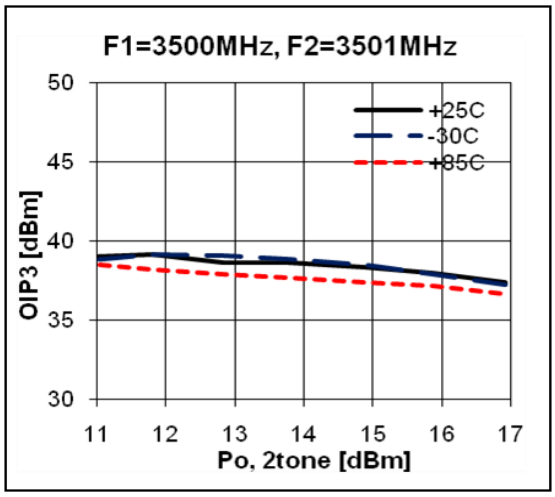
Typical Performance



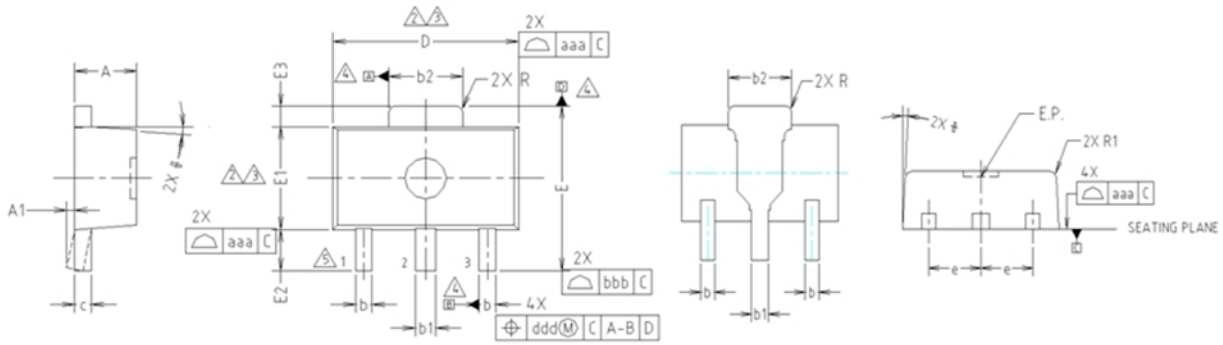








Package Outline Dimension



NOTE:

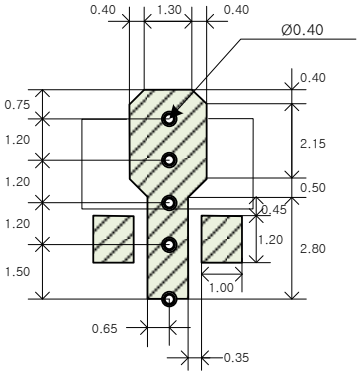
1. DIMENSIONS IN MILLIMETERS.
2. DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.5mm PER END. DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.5mm PER SIDE.
3. DIMENSIONS D AND E1 ARE DETERMINED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
4. DATUMS A, B AND D TO BE DETERMINED 0.18mm FROM THE LEAD TIP.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	1.40	1.50	1.60	
A1	0.00	–	0.10	
b	0.38	0.42	0.48	
b1	0.48	0.52	0.58	
b2	1.79	1.82	1.87	
c	0.40	0.42	0.46	
D	4.40	4.50	4.70	2,3
E	3.70	4.00	4.30	
E1	2.40	2.50	2.70	2,3
E2	0.80	1.00	1.20	
E3	0.40	0.50	0.60	
e	1.50 TYP.			
θ	4° TYP.			
R	0.15 TYP.			
R1	–	–	0.20	

SYMBOL	TOLERANCES OF FORM AND POSITION	NOTE
aaa	0.15	
bbb	0.20	
ccc	0.10	
ddd	0.10	

Suggested PCB Land Pattern and PAD Layout

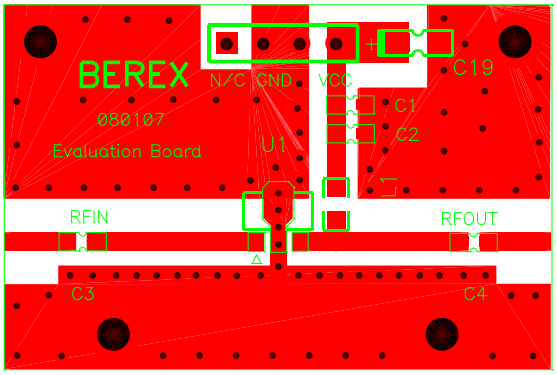
PCB Land Pattern



Note : All dimension are in millimeters

PCB lay out _ on BeRex website

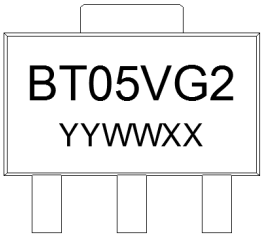
PCB Mounting



BT05VG2

1500-4000 MHz Wideband Drive Amplifier

Package Marking

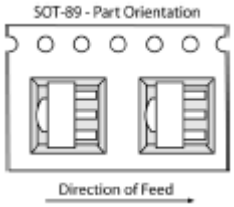


Pin 1

YY = Year, WW = Working Week,
XX = Wafer No.

Tape & Reel

SOT89



Packaging information:

Tape Width (mm): 12

Reel Size (inches): 7

Device Cavity Pitch (mm): 8

Devices Per Reel: 1000

Lead plating finish

100% Tin Matte finish

(All BeRex products undergoes a 1 hour, 150 degree C, Anneal bake to eliminate thin whisker growth concerns.)

MSL / ESD Rating

ESD Rating:	Class 1B
Value:	**Passes <1000V**
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114B
MSL Rating:	**Level 1 at +265°C convection reflow**
Standard:	JEDEC Standard J-STD-020

NATO CAGE code:

2	**N**	**9**	**6**	**F**